Development of scale to measure perceived physical education class climate: A cross-national project

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Development of scales to measure perceived physical education class climate: a cross-national project

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Motivational research in the classroom has adopted a social cognitive perspective but has mainly been restricted to the study of individual achievement cognitions. In addition to this, there is a need to study and assess the perception children have of the class climate. Using social cognitive theory as a base, this research reports the development of class climate scales in French and English for use in physical education classes. Psychometric development with the French scale was shown to be satisfactory, including adequate factorial structure assessed by exploratory and confirmatory factor analysis (CFA), and good internal and test-retest reliability. A parallel English scale demonstrated a less adequate fit to the proposed model when using CFA, but shortened scales assessing just mastery and performance dimensions of climate were shown to predict important motivational measures in a structural equation modelling analysis.

Relatively little has been published on motivational processes in physical education (PE) contexts, although the literature is rather more extensive when considering children in volunteer sport (Lee, 1993; Smoll, Magill & Ash, 1988). However, this does not consider the full range of different types of children and thus research findings with such groups lack generalisability

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beyond other volunteer groups. This supports the need to study a full cross-section of children in school settings if we are truly to understand children's involvement in physical activity.

Contemporary theoretical perspectives on motivation favour a social cognitive viewpoint (Fiske & Taylor, 1991) whereby the emphasis is firmly on self and other person perceptions and on how we make sense of such events. Historically, research on education avoided such cognitive perspectives. As Schunk (1992) said, 'research on teaching historically offered a limited view of the role of student perceptions in the classroom' (p. 5). Schunk went on to describe the 'metacognitive' processes in student perceptions and learning whereby students process information about people ('am I better than others?'), tasks (how task demands influence performance), and strategies (different strategies necessary for task accomplishment). Much of this metacognitive processing underpins recent work on motivation.

One social cognitive perspective receiving a great deal of attention in classroom research (Nicholls, 1989), as well as research in sport (Duda, 1993; Thill, 1989) and school physical education (Goudas, Biddle & Fox, 1994*a*, 1994*b*), is that of achievement goal orientations. Research has shown that pupils can define success with reference to normative comparison ('ego' goal) or in self-referenced ('task'/'mastery' goal) terms. There may be other goals, but these two have been the most extensively studied (Famose, Sarrazin & Cury, 1992).

In PE and sport, for example, Duda, Fox, Biddle & Armstrong (1992) found that a task orientation was associated with beliefs that success in sport was due more to effort and cooperation than ability, whereas ego-oriented children viewed ability as the prime determinant of success. Similarly, since ego and task goals are largely uncorrelated, Fox, Goudas, Biddle, Duda & Armstrong (1994) found that a group of 11-year-old children low in both task and ego goal orientations were significantly lower in perceived sport competence and enjoyment, were made up primarily of girls, and appeared to be at high risk of sport non-participation. On the other hand, high sport enjoyment was reported by children classified as high task/low ego or high task/high ego.

Individual dispositions towards task or ego goals, therefore, provide an important perspective on social cognitive motivational factors in PE and sport settings. However, one could argue that this leaves little room for intervention on the part of the teacher unless environmental factors are influenced and changed. Consequently, one also needs to investigate situational differences in achievement orientations. This has led to recent interest in studying the learning environment, or at least pupil perceptions of such environments. For example, when pupils are only praised when they demonstrate superior performance in comparison with others, or when mistakes are viewed negatively, this can be referred to as a 'performance' or 'comparison' climate. On the other hand, if the students are directed towards self-improvement, and praise is given for trying hard, this is a 'mastery' climate. Some refer to this field as 'motivational climate' (Ames, 1992; Goudas & Biddle, 1994; also see Papaioannou, 1995).

Ames & Archer (1988) found that perceptions of a mastery climate were positively correlated with motivationally adaptive perceptions, such as positive class attitudes, use of effective learning strategies, and preferences for challenging tasks. In PE, Papaioannou (1994) found that intrinsic motivation and positive attitudes towards lessons were correlated with mastery climate measures.

Since the study of class climate based on contemporary social cognitive theory is relatively new, there is a need to investigate the measurement of perceived class climate. Given the unique climate and tasks associated with PE, it is likely that a generic classroom scale may not be wholly appropriate to use in PE settings. Although Ames & Archer (1988) were the

first to use a social cognitive framework to assess classroom goals. Papaioannou (1994) was the first to assess PE class goals. Using over 1700 Greek school students, he developed the 'Learning and Performance Orientations in PE Classes Questionnaire' (LAPOPECQ). This was a multidimensional and hierarchical questionnaire with two higher-order factors of 'learning' (mastery) and 'performance' underpinned by subscales assessing (a), learning: 'teacher-initiated learning orientation', 'students' learning orientation', and (b), performance: 'students' competitive orientation', 'students' worries about mistakes', and 'outcome orientation without effort'. Goudas & Biddle (1994) adapted and extended this scale by developing the PE Class Climate Scale (PECCS) for use in English schools. This is described in more detail in the research reported in this paper. They found that for secondary school pupils in England mastery dimension scores significantly enhanced the prediction of intrinsic motivation beyond that accounted for by perceived competence, but this was not the case for performance dimension scores.

This paper reports a cross-national research project investigating the measurement of perceived class climate in physical education lessons. Data are reported from five studies in France and England involving 975 children and youth. Study I is a test of the psychometric properties of the French translation of the PECCS, and Study II extends this analysis through the use of confirmatory factor analysis. Study III, also in France, investigates the temporal stability of the scale. Study IV is a confirmatory factor analysis of the PECCS in England, and the final study involves an investigation of the relationships between motivational climate and related motivational variables, tested through structural equation modelling.

Study I: Initial psychometric evaluation

The purpose of this study was to test a French version of Goudas & Biddle's (1994) PE Class Climate Scale to ascertain the degree of cross-cultural compatibility between a scale developed in England and one translated for use in France.

The original 28-item PECCS was developed by taking four of five subscales from Papaioannou's (1994) LAPOPECQ ('class learning orientation', 'teacher promotion of learning', 'class competitive orientation', and 'worries about mistakes'). In addition, and based on prior research into classroom climate and student motivation (see Moos & Trickett, 1987), subscales were added on 'student perceptions of choice' and 'student perceptions of teacher support' (see Appendix 2).

Method

Sample

Pupils attending four schools in Paris participated in the study (N=311; 166 girls and 145 boys). Their ages ranged from 13 to 16 years (mean=14.75, SD=0.81). The sample was diverse in socio-economic background and all pupils approached agreed to participate. Pupils were sampled randomly across age groups.

Procedure

The PE Class Climate Scale from Goudas & Biddle (1994) was translated into French and checked through the backward translation technique. Thirty-two items from seven proposed subscales were translated. The subscales referred to four 'mastery' dimension factors of

'class learning orientation', 'teacher promotion of learning', 'teacher support', and 'studer choice', and two 'performance' dimension factors of 'class competitive orientation' an 'worries about mistakes'. The subscale of 'promotion of comparisons by the teacher' wa also included from earlier unpublished work by Goudas and Biddle. The questionnair items began with the stem 'In my PE class ...' and five-point Likert scales were use anchored by 'don't agree at all' (1) and 'agree completely' (5).

The questionnaire was named 'L'Echelle de Perception du Climat Motivational' (EPCM 'Perception of Motivational Climate Scale'). Pupils were asked to respond by making reference to what occurred most often in their physical education classes. Questionnaires were answered anonymously in about 10 minutes and only volunteer pupils were accepted.

Results and discussion

To reduce the number of items of the EPCM and to make it more manageable, a principal components analysis was performed and items with loadings less than 0.4 were deleted. In addition, three items were deleted where the internal reliability (Cronbach alpha) was improved. This left 19 items in the questionnaire from which an oblique rotation factor analysis was performed. A clear five-factor solution resulted for factors with eigenvalues greater than 1 and accounted for 71 per cent of the variance (see Table 1). The five factors were labelled 'pursuit of progress by pupils', 'promotion of learning by the teacher', 'pursuit of comparison by pupils', 'worries about mistakes', and 'promotion of comparison by the teacher'. 'Student choice' and 'teacher support' subscales were not confirmed.

Table 1. Factor pattern loadings from exploratory factor analysis, using oblique rotation, of 19-item EPCM (Study I)

Subscales	Item	Factors				
		1	2	3	4	5
Pursuit of Progress by Pupils	1		.736			
	6		.726			
	11		.724			
	15		.659			
	19		.711			
Promotion of Learning by the Teacher	3			.619		
	8			.753		
	13			.762		
	16			.616		
Pursuit of Comparison by Pupils	2					.715
	7					.755
	12					.596
Worries about Mistakes	5	.762				
	10	.726				
	14	.752				
	18	.747				
Promotion of Comparison by the Teacher	4				.736	
	9				.606	
	17				.709	

Using the five subscales as variables, a second-order oblique factor analysis was performed. A two-factor solution resulted, explaining 68.8 per cent of the variance (see Table 2). The two factors were labelled 'mastery' (containing the subscales of pursuit of progress by pupils and promotion of learning by the teacher), and 'comparison' (containing the remaining three subscales). This dichotomy is consistent with the mastery and performance factors shown by Goudas & Biddle (1994).

Table 2. Second-order exploratory factor analysis, using oblique rotation, of the five EPCM subscales (Study I)

Subscales	Factors	
	Comparison	Mastery
Pursuit of Progress by Pupils		.847
Promotion of Learning by the Teacher		.844
Pursuit of Comparison by Pupils	.850	
Worries about Mistakes	.799	
Promotion of Comparison by the Teacher	.708	

The internal reliability of the five first-order factors and two second-order factors was assessed by computing Cronbach alphas. All were above .78 and considered satisfactory (see Table 3).

Table 3. Internal reliability (Cronbach alpha) coefficients for EPCM subscales (Study I)

Subscale	Alpha
First-order factors	
Pursuit of Progress by Pupils	.885
Promotion of Learning by the Teacher	.794
Pursuit of Comparison by Pupils	.819
Worries about Mistakes	.895
Promotion of Comparison by the Teacher	.783
Second-order factors	
Mastery Dimension	.869
Comparison Dimension	.872

The results from the 19-item EPCM are similar to those of Papaioannou (1994) and Goudas & Biddle (1994) and confirm the presence of two higher-order factors of mastery and comparison/performance as perceived by pupils in PE classes. However, the subscales underpinning these factors appear to be slightly different between French and English samples. This may be a reflection of the nature of PE classes in the two countries or, despite the careful method, slight differences in meaning associated with translating items, although these possibilities require further study.

Study II: A confirmatory factor analytic study

To test further the psychometric properties of the EPCM, and in particular its factor structure, a confirmatory factor analysis was performed on the scale with a new sample.

Method

Sample

This study involved 179 pupils (106 girls and 73 boys) from three schools in Paris. The pupils were aged 14–16 years (mean=14.83, SD=0.68) and were representative of diverse socioeconomic backgrounds. Pupils were randomly sampled and none refused to participate.

Procedure

The 19-item French language EPCM was administered in the same way as described in Study I.

Results and discussion

A confirmatory factor analysis (CFA) was conducted using LISREL VII (Joreskog & Sorbom, 1989). The specified model is shown in Figure 1 and is based on the results from Study I. It shows a hierarchical model of PE class climate comprising the two higher-order factors of mastery and comparison, and the five first-order factors.

Table 4 summarises the main fit statistics for the CFA. Although the chi^2 statistic is significant, it is known that this is sensitive to sample size such that the greater the number of subjects, the smaller the chance of accepting the null hypothesis (Loehlin, 1992). The other fit statistics suggest a good fit of the data to the model. The chi^2/d.f. ratio is less than 2, GFI greater than .9, the AGFI greater than .85, and the RMSR is a satisfactory .066. The two second-order factors of mastery and comparison were largely uncorrelated, although the research to date on the correlation between these dimensions is inconsistent. The results, therefore, support the factorial structure of the EPCM.

Table 4. Goodness of fit indices for confirmatory factor analysis (Study II)

Chi^2 = 173.25 d.f. = 89
$p<.05$
Chi^2: d.f. ratio = 1.95
Goodness of Fit Index (GFI) = .910
Adjusted Goodness of Fit Index (AGFI) = .870
Root Mean Square Residual (RMSR) = .066

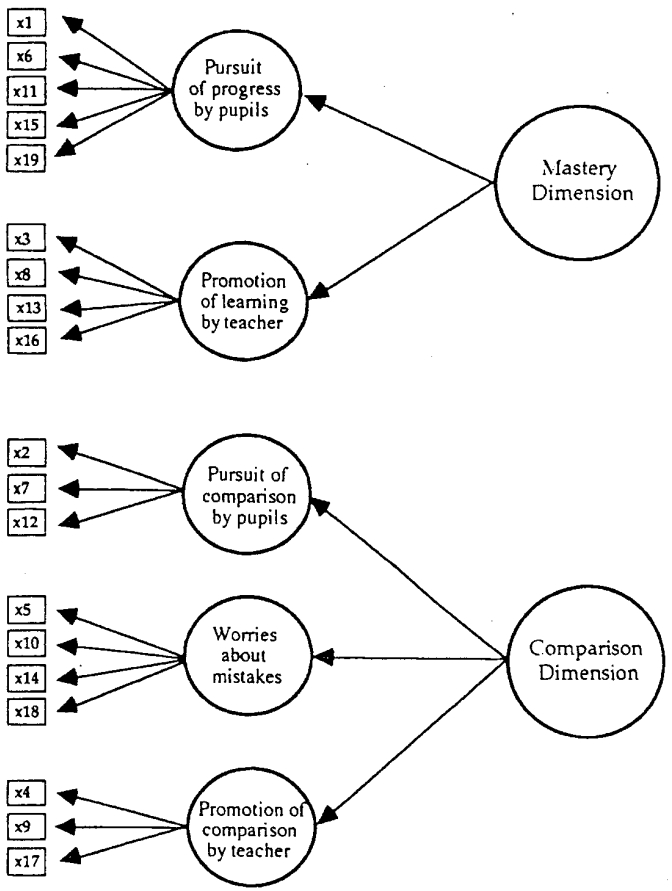

Figure 1. Structural model of the EPCM tested in Study II through confirmatory factor analysis

Study III: Evaluation of temporal stability of the EPCM

The purpose of this study was to test the stability of the responses to the EPCM, with a new sample, over a one-week period during which no changes to the PE class climate took place.

Method

Sample

Pupils from four schools in Paris took part (N=146; 84 girls and 62 boys), aged 14–16 years (mean=15.0, SD=0.79). The pupils were representative of diverse socioeconomic backgrounds and were randomly sampled. No pupils refused to participate.

Procedures

The EPCM was administered in the same way as described in Studies I and II. In addition, the questionnaire was answered for a second time one week later. The pupils were identified by birth date and sex only to retain anonymity.

Results and discussion

Test-retest correlations were computed for the five subscales as well as the mastery and comparison dimensions (see Table 5). The results showed satisfactory temporal stability over the one week period with all correlations above .69. In addition, the internal consistency of the scales was confirmed by the Cronbach alphas for each administration of the EPCM. As shown in Table 5, all alphas were satisfactory and above .69.

Table 5. Test-retest correlations and Cronbach alpha coefficients (Study III)

Subscales	Test-retest Correlation	Alpha (Test)	Alpha (Retest)
First-order factors			
Pursuit of Progress by Pupils	.776	.903	.931
Promotion of Learning by the Teacher	.830	.693	.848
Pursuit of Comparison by Pupils	.750	.875	.774
Worries about Mistakes	.745	.736	.854
Promotion of Comparison by the Teacher	.692	.792	.821
Second-order factors			
Mastery Dimension	.873	.780	.916
Comparison Dimension	.856	.872	.909

Study IV: A confirmatory factor analysis of the English PE Class Climate Scale

The PECCS was used by Goudas & Biddle (1994) to investigate the relationships between perceived PE class climate and intrinsic motivation. However, their analysis did not involve confirmatory factor analysis. The purpose of this study, therefore, was to reanalyse data reported by Goudas & Biddle to see whether results parallel those of the French EPCM.

Method

Sample

Participants were 154 boys and 100 girls aged 13–15 years and were randomly sampled from three comprehensive schools in London and the south-west of England, covering a diverse socio-economic range. No pupil refused to participate.

Procedure and instrumentation

As part of a larger study, the students completed an inventory pack in their classroom, including the PECCS. As discussed in the introduction, Goudas & Biddle (1994) based the PECCS on Papaioannou's (1994) LAPOPECQ, but extended the number of subscales based on prior classroom environment research. Six subscales were therefore developed and are labelled in Figure 2. Again, two higher-order dimensions were hypothesised to represent the six subscales of the PECCS — mastery and performance. The stem for all items was 'In my PE class ...' and responses were made on five-point scales anchored by 'not at all' (1) and 'very much so' (5). Of the original 28-item scale, two items were deleted to improve the internal reliability of the subscales. This left the PECCS with 26 items for the CFA (see Appendix 2).

Results and discussion

The construct validity of the PECCS was tested with confirmatory factor analysis using LISREL VI (Joreskog & Sorbom, 1984). Figure 2 shows the hypothesised structure of the inventory. The six subscales were modelled as first-order factors, with the second-order factors representing the dimensions of mastery and performance modelled to account for the six subscale factors. Initially, the two higher-order factors were modelled to be correlated. However, the obtained correlation was only 0.028, therefore indices of fit were recomputed with the two dimensions not allowed to be correlated.

The indices of fit presented in Table 6 show only a moderately good fit. The chi^2/d.f. ratio is 2.26, indicating an acceptable fit, but the GFI and AGFI were only moderately high and the RMSR was quite high, indicating room for improvement in the model. Nevertheless, the difference between the hypothesised and null models was significant.

Table 6. Indices of fit for PECCS from Study IV

Indices of Fit	Hierarchical Model	Null Model
Chi^2	561.94	1631.92
D.f.	248	276
Chi^2/d.f. ratio	2.26	5.91
GFI	0.818	0.412
AGFI	0.780	0.360
RMSR	0.183	0.239

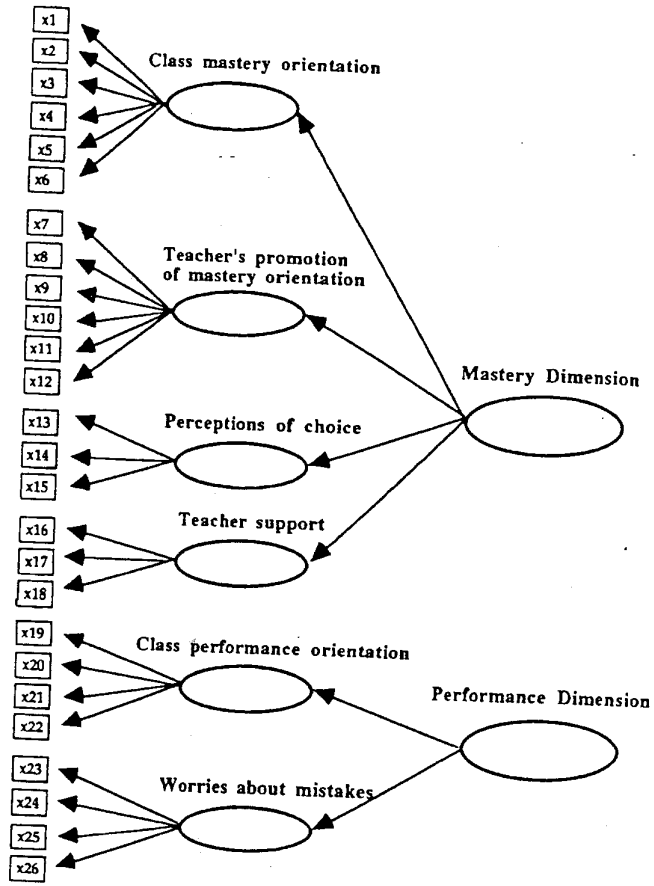

Figure 2. Structural model of the PECCS tested in Study IV through confirmatory factor analysis

The results suggest that the PECCS is hierarchical, but the CFA showed that the data fit the hypothesised model only moderately well, and that there is room for improvement. Further study is needed to see if the hypothesised model can be confirmed with more conviction. Nevertheless, the PECCS was supported to some extent and further research using the instrument, if cautious, is warranted, particularly when coupled with the results reported by Goudas & Biddle (1994).

Study V: A structural equation modelling analysis of PE class climate and related motivational constructs

So far, the four research studies presented have focused on the psychometric properties of French and English scales designed to assess perceived PE class climate. The purpose of this exploratory study, therefore, was to test, through a structural equation modelling (SEM) analysis, the relationships between dimensions of PE class climate and other motivational constructs.

Duncan & Stoolmiller (1993) suggest that SEM has recently become a useful methodological tool for 'the systematic development and testing of complex theories representing social and behavioural processes' (p. 1), and they call for further use of SEM in the study of physical exercise. SEM has an advantage over regression analytic approaches in so far as parameters of the model specified are assessed simultaneously, thus avoiding excessive data analysis. Similarly, a hypothesised model can be tested against the data observed, thus contributing to stronger theory testing.

Parts of this study have already been reported in this journal (Goudas *et al.*, 1994*b*), but data on PE class climate were not included. This study, therefore, will report class climate in addition to the data already published. For a full outline of instrumentation, see Goudas *et al.* (1994*b*).

Method

Sample

Participants in this study were 85 pupils (39 boys and 46 girls) from a comprehensive school located in a rural setting approximately three miles outside a small city in the south-west of England. The pupils were from two classes in each of Years 7 and 8 (aged 12–14 years). All pupils agreed to take part.

Procedure and instrumentation

The pupils were administered an inventory pack on two occasions, with the exception of goal orientations which were assessed only once. Questionnaires were completed either during a football (boys only) or netball (girls only) lesson and a gymnastics (mixed sex) lesson. The same children were involved in both football/netball and gymnastics.

PE Class Climate Scale. Given the length of the inventory pack, a shortened 18-item version of the PECCS was administered assessing the five of the six subscales and two higher-order dimensions of the PECCS discussed in Study IV. Items were selected on the basis of internal reliability analyses conducted on the full scale. The class mastery subscale was not used as a sufficient number of mastery items existed. Also, our prior research (Goudas & Biddle, 1994) suggested some redundancy between the 'class mastery' and

'teacher promotion of mastery' subscales. We wanted to retain at least three items per subscale. Details of items are given in Appendix 2.

Achievement goal orientations. An established English version of the 'Task and Ego Orientation in Sport Questionnaire' (TEOSQ; Duda *et al.*, 1992) was used to assess the extent to which pupils defined success as task/mastery or ego (social comparative).

Motivational orientations. These were assessed using items from the Academic Self-Regulation Questionnaire (ASRQ; Ryan & Connell, 1989). Four subscales were used to compute a 'Relative Autonomy Index' (RAI), or an indication of perceived autonomy/control, by weighting the four scales as follows: external regulation (-2), introjected regulation (-1), identification (+1), and intrinsic motivation (+2). High scores indicate higher perceived autonomy or control (see Ryan & Connell, 1989).

Other measures. In addition, measures were taken of intrinsic interest in the two activities, perceived competence in the two tasks, and intention to participate in the activities in the future if given a choice.

Results and discussion

Analysis of the PECCS

Initial analysis of the PECCS subscales suggested poor internal reliabilities. However, when the items were considered as indicators of the mastery and performance dimensions within each physical activity, Cronbach alpha coefficients were satisfactory (Mastery: football/netball=.84, gymnastics=.69; Performance: football/netball=.64, gymnastics=.74). Given these data, coupled with the exploratory use of a shortened PECCS, it was decided to use only mastery and performance dimensions for the analysis of PE class climate.

A confirmatory factor analysis, using LISREL VI, was performed by having appropriate items modelled to form either a mastery or performance factor, and to treat these as first-order factors. However, the goodness of fit statistics showed room for improvement (see Table 7), although the chi^2/d.f. ratio was less than 3, which is considered satisfactory by Joreskog (1969). With this result, coupled with adequate internal reliability of the two dimensions, it was considered appropriate to continue, albeit with caution, by computing scores for mastery and performance dimensions and using these in subsequent analyses.

Table 7. Indices of fit for shortened version of the PECCS from Study V

Indices of Fit	Football/Netball	Gymnastics
Chi^2	222.78	197.16
D.f.	104	103
P	<.001	<.001
Chi^2/d.f. ratio	2.14	1.91
GFI	0.750	0.751
AGFI	0.673	0.671
RMSR	0.162	0.119

Structural equation modelling analysis

In order to examine the role of PE class climate in a more complex network of relationships, structural equation modelling (SEM) analysis was performed using LISREL VI. In SEM, a

model is hypothesised to account for the covariances among the observed variables. Parameters of the model are estimated so the fit of the observed covariances to the specified model is maximised. Next, the produced model is evaluated by comparing it to the covariance structure implied by the hypothesised model. The indices of fit provide information about the resemblance of the observed covariances to those implied by the model.

A model was specified, tested and revised for the data from the football/netball administration. Then, it was examined whether this model could account for the gymnastics data. In the model that was specified initially, the individual difference variables of goals, RAI and perceived competence were assumed to mediate the effects of perceived class climate on intrinsic interest and intention. It was assumed that the perceived mastery climate dimension would be associated with a task orientation and autonomy (RAI), while the perceived performance dimension was modelled to be linked with ego orientation. The effect of ego orientation on intrinsic interest was assumed to be mediated by perceived competence, and intrinsic interest was modelled to be associated with intention.

The indices of fit for Model 1 suggested that there was room for improvement (see Table 8), so the modification indices provided by LISREL were examined. These indicate the decrease in the chi^2 value when a specific parameter that had been constrained is relaxed. On the basis of the modification indices, the model was revised by adding a direct influence path from perceived competence to intention (Model 1a, Figure 3). The improvement in fit was statistically significant as assessed by chi^2 difference test. Although the chi^2 was still significant, the other indices of fit indicate a fairly satisfactory, although far from perfect, fit (see Table 8).

Table 8. Indices of fit for structural equation models tested in Study V

Indices of Fit	Model 1	Model 1a	Model 2	Model 2a
Chi^2	42.10	32.09	47.68	24.74
D.f.	18	17	17	18
P	<.001	.015	<.001	.132
Chi^2/d.f. ratio	2.34	1.89	2.80	1.37
GFI	.882	.910	.854	.924
AGFI	.763	.809	.690	.849
RMSR	.127	.116	.083	.077

It was then examined whether Model 1a would account for the data from the gymnastics classes. However, this was not the case (see Model 2 in Table 8), so a revision of the model was carried out to improve the fit. The model was recomputed by deleting paths that were not significant in Model 2 and by adding paths suggested by the modification indices (see Model 2a shown in Figure 4). By doing this, a good fit was obtained (see Table 8).

As shown in Figure 4, the perceived mastery climate dimension had a direct influence on intrinsic interest and intention for gymnastics, whereas for football/netball (Figure 3) the effect of perceived PE class climate was indirect through individual differences in goals. Given that the pupils were less motivated towards gymnastics than football/netball, it can be suggested that when students are not highly motivated, situational variables like class climate can enhance intrinsic interest and intentions. However, when motivation is high, as in football/netball, individual goal orientations appear to be more directly important.

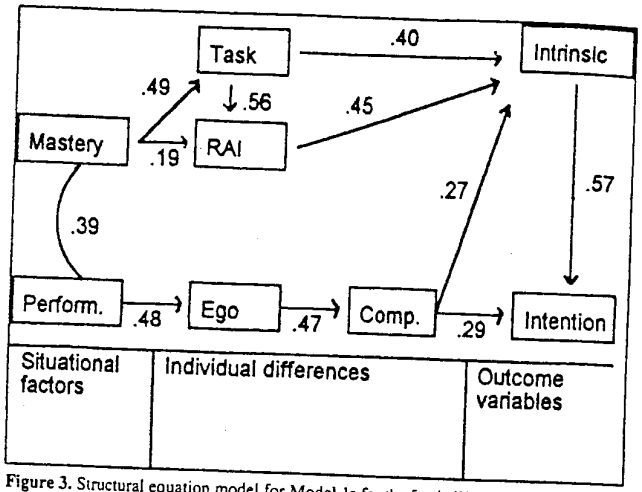

Figure 3. Structural equation model for Model 1a for the football/netball data
Curved lines represent relationships with no specified causal influence. All path coefficients significant at $p<.01$

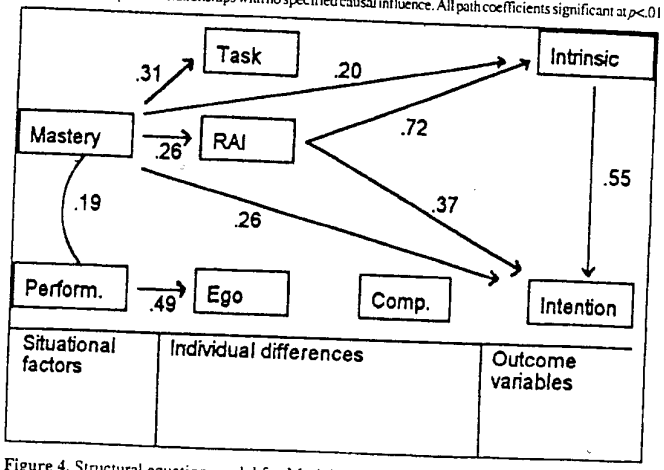

Figure 4. Structural equation model for Model 2a for the gymnastics data
Curved lines represent relationships with no specified causal influence. All path coefficients significant at $p<.01$

Overall, these results suggest that PE class mastery and performance climate dimensions can be assessed with 12–14 year-old school students and that a mastery dimension may be associated with intrinsic interest and intentions to participate.

General discussion

The assessment of perceptions of class climate, in PE and other subject areas in schools, may be important for furthering our understanding of motivational processes. It may also guide interventions, such as variations in teaching style designed to change a class climate. The research reported here suggests that the two higher-order factors of mastery and performance/comparison are quite robust and central to pupil perceptions of the class.

The French language scale — the EPCM — was shown to be psychometrically sound, with its hierarchical factorial structure supported through confirmatory factor analysis. Subscales were also shown to be internally and temporally reliable across different samples. In summary, therefore, the use of the EPCM appears warranted with French-speaking school pupils. Further work is required, however, such as demonstrating predictive and concurrent validity.

The data on the English PECCS were less satisfactory in terms of the proposed factorial structure, with the confirmatory factor analysis fit statistics showing only a moderate fit. Further work seems to be required in refining the scale, although preliminary work could proceed on the assumption that studies would include psychometric testing of the scale before analysing it further. However, the higher-order domains of mastery and performance appeared to be fairly robust and consistent with the data from France.

Study V used a shortened version of the PECCS, with only mastery and performance dimensions being used in the analyses. Using structural equation modelling analysis, mastery class climate perceptions were shown to influence intrinsic interest in, and intentions to play, football or netball, although only indirectly through dispositional goal orientations and perceived autonomy. Since the motivation towards these sports was high, it appears from these results that a fuller picture of motivation is likely to be obtained when situational factors (class climate) and individual differences (goals) are accounted for. Interestingly, for the gymnastics classes, where motivation was lower, the situational class climate perceptions were directly predictive of intrinsic interest in, and intentions to perform, gymnastics. These results show that short scales assessing mastery and performance climate may be useful in understanding the complex interactional chain of events between the environment, the child and behaviour.

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Appendix 1: English translation of EPCM

Stem: 'In my PE class . . .'

Pursuit of Progress by Pupils
1. the pupils are very pleased when they learn new skills and games
6. what the pupils learn encourages them to practise more
11. the pupils learn new things and feel pleased
15. the pupils are happy when they do their best to learn
19. the pupils are very happy when they correctly perform a movement they have learnt

Promotion of Learning by Teacher
3. the PE teacher is pleased when each pupil learns something new
8. the PE teacher is pleased when everyone progresses after having put in some effort
13. the PE teacher is pleased when everyone's skills progress
16. the PE teacher is pleased when everyone improves

Pursuit of Comparison by Pupils
2. pupils try to do better than one another
7. the pupils are very satisfied when they do better than others
12. it's when pupils do better than others that they are most happy

Worries about Mistakes
5. the pupils worry about making mistakes
10. the pupils are afraid of getting things wrong
14. the pupils are afraid of trying things that they might get wrong
18. the pupils are afraid of trying things at which they might make mistakes

Promotion of Comparison by Teacher
4. the teacher particularly appreciates those who win
9. the PE teacher only bothers with those who do well in sport
17. the teacher encourages those who are good at sport

Appendix 2: PE Class Climate Scale (PECCS) grouped by subscales

Note:
1. Items 13a and 21a are from the original 28-item PECCS, but were later discarded to leave the 26-item version reported here in Study IV.
2. Items included in the shortened version of the PECCS, used in Study V, are shown by*.

Stem: 'In my PE class . . .'

Class Mastery Orientation
1. We feel very satisfied when we learn new skills and games
2. We usually learn something new and feel happy about this
3. What we learn makes us want to practise more
4. Pupils enjoy when they try their best to learn a new skill
5. Pupils are very satisfied when they correctly perform the skills they have learned
6. Learning a certain amount in every lesson is important

Teacher's Promotion of Mastery Orientation
7. The PE teacher is most satisfied when every student learns something new*
8. The PE teacher insists that our mistakes are part of learning*
9. The PE teacher makes sure I understand how to do a new skill before we go on to new ones
10. The PE teacher is satisfied when students are improving after putting in some effort*
11. The PE teacher is satisfied when everyone is improving in skills
12. The PE teacher pays special attention to whether I am improving on skills*

(Student) Perception of Choice
13. Pupils are often given the opportunity to plan their own activities*
13a. Pupils are often given the opportunity to assess themselves
14. Pupils are often given the opportunity to say what they think about a certain activity*
15. Pupils have a choice of what activities they take part in*

Teacher Support
16. The teacher cares about most pupils*
17. The teacher takes a personal interest in the students*
18. The teacher is more a friend than a figure of authority*

Class Performance Orientation
19. We try to do better than other students*
20. We try to gain rewards by doing better than other students*
21. Students feel most satisfied when they manage to do better than others*
21a. Successful students are those who do better on skills
22. It is very significant for a student to show that (s)he is better in sports than others*

Worries About Mistakes
23. Students worry about making mistakes because it would cause the disapproval of other students*
24. Students worry about possible failure because the PE teacher would disapprove of them*
25. Students worry about practising skills they are not good at*
26. Students are often afraid to try new skills*